The Effects of Absorbent Materials on Scattering in GPS

A Mikolajcik ; M A Smith; A Donnellan; D C Jefferson (Jet Propulsion Laboratory, Pasadena, CA, 91 109; ph. 818-354-3276; c-mail: axm@cobra.jpl.nasa.gov)

GPS data analysis techniques have improved to the point that precision 011 the order of 3, 5, and 9 mm in north, east, and vertical components is routinely achievable at well placed sites (Heflin, 1995). Signal scattering, or multipath, can degrade the precision of station position, primarily in the vertical Component. This is particularly a problem in the global GPS tracking network where the concrete pillar and stainless steel plate embedded in the pillar are significant sources of scattering (Elosequi, et al., 1995). We have experimented with different materials to find ways to mitigate this effect. Eight tests were conducted in which three different absorbent materials were tested, as well as a new antenna mount design. The tests included two configurations: the standard monument with stainless steel plate, antenna ring and hardware, and a Micarta (pressed linen) antenna ring with hardware. For each configuration (stainless steel and Micarta) R/F absorber and charcoal were, in separate experiments, placed between the antenna ring and pillar and tested for scattering reduction contributions. Three days of data were collected for each experiment and we solved for daily position solutions using JPL precise orbits and point positioning. Initial results show that the greatest reduction of signal scattering occurred when the Micarta antenna ring and hardware were used. In this case the repeatability improved by about a factor of two (the site is noisier than most of the global stations). Neither R/F absorber or charcoal improved the results and significantly degraded the results when the materials were wet. The results imply that the steel mounting hardware used in the global network is as much a liability in precision as the steel mounting plate. Replacing the current mounts with Micarta mounts is an inexpensive way of improving the quality of data from the global GPS tracking network.

American Geophysical Union Abstract Form

Reference# 0000
session 0.00

1. 1996 Spring Meeting
2. 07358687
3. (a) A Mikolajcik
   Jet Propulsion Laboratory
   Pasadena, CA 91109 USA
   axm@cobra.jpl.nasa.gov
   (b) 818-354-3276
   (c) 818-393-4965
4. G
5. (a) G04
   (b) 1294, 1299
   (c)
6. N/A
7. O% published elsewhere
8. Charge $30 to Anne Mikolajcik VISA card 4128003251293562, expires 09/96
9. C
10. No special instructions
11. Student author

Date received: 25 JUL 95
Date formatted: February 28, 1996
Form version: 1.3